

-continued

Nitrocellulose (containing 30% of n-propanol)	4.2 weight parts
Xylenediamine (1 mole)-glycidyl methacrylate (4 moles) adduct	2.0 weight parts
Ethyl Michler's ketone	0.2 weight part
Tetrahydrofuran	90 weight parts
(Formation of a silicone rubber layer)	

A silicone rubber layer was formed on the above light-to-heat conversion layer by applying thereto a coating composition prepared in accordance with the recipe given below to a dry film thickness of 2 μm .

α,ω -Divinylpolydimethylsiloxane (degree of polymerization: ca 700)	9.0 weight parts
$(\text{CH}_3)_2\text{Si}-\text{O}-(\text{SiH}(\text{CH}_3)-\text{O})_8-\text{Si}(\text{CH}_3)_3$	0.6 weight part
Polydimethylsiloxane (degree of polymerization: ca 8,000)	0.5 weight part
Olefin-chloroplatinic acid	0.08 weight part
Inhibitor $\text{HC}\equiv\text{C}-\text{C}(\text{CH}_3)_2-\text{O}-\text{Si}(\text{CH}_3)_3$	0.07 weight part
Isopar-G (product of Esso Chemical)	55 weight parts

Writing was made on the plate obtained in the above manner, using a semiconductor laser with an oscillation wavelength of 830 nm and a beam diameter of 10 μm . The power on the plate was 110 mW. A printing plate with sharp edges could be produced; the laser recording sensitivity was 200 mJ/cm² and the resolution was 8 μm .

Example 16

Making of an Original Plate for Direct Printing Plate Making

A plate for direct printing plate making was produced in the same manner as in Example 11 except that, in Example 15, 0.1 weight part of the compound (47) was used in lieu of 0.1 weight part of the compound (11).

Writing was made on the plate obtained in the above manner, using a semiconductor laser with an oscillation wavelength of 830 nm and a beam diameter of 10 μm . The power on the plate was 110 mW. A printing plate with sharp edges could be produced; the laser recording sensitivity was 200 mJ/cm² and the resolution was 8 μm .

Example 17

Making of an Original Plate for Direct Printing Plate Making

A plate for direct printing plating making was manufactured in the same manner as Example 11 except that, in Example 15, 0.1 weight part of the compound (55) in Table 1 was used in lieu of 0.1 weight part of the compound (11).

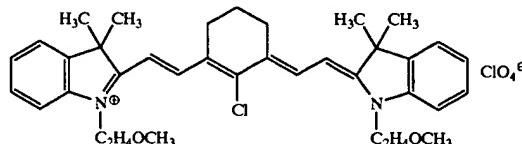
Writing was made on the plate obtained in the above manner, using a semiconductor laser with an oscillation wavelength of 830 nm and a beam diameter of 10 μm . The power on the plate was 110 mW. A printing plate with sharp edges could be produced; the laser recording sensitivity was 200 mJ/cm² and the resolution was 8 μm .

Comparative Example 1

The procedure of Example 13 was repeated except that 0.2 g of the polymethine compound having the structural formula shown below, which is described in JP Kokai S63-319191, was used in lieu of 0.2 g of the compound (11). In a light microscopic examination of the sample after completion of the irradiation, no through hole formation was

observed even when the laser power arriving at the surface was 100 mW.

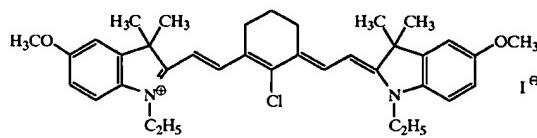
Compound A



Comparative Example 2

Except that, in Example 13, 0.2 g of the polymethine compound of the following chemical formula as described in Journal of Organic Chemistry, 60, 2392, Table 1 was used in lieu of 0.2 g of the compound (11), the procedure described in Example 13 was repeated. In a light microscopic examination of the sample after completion of the irradiation, no through hole formation was observed even when the laser power arriving at the surface was 50 mW.

Compound B

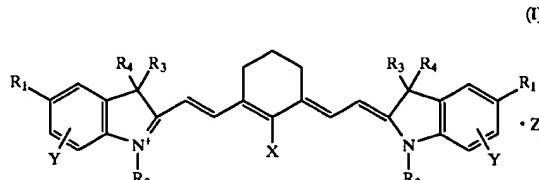


EFFECTS OF THE INVENTION

The polymethine compound of general formula (I) shows less absorption in the visible region, and the near infrared absorbing material comprising this compound can be used with advantage in laser thermal transfer recording materials and laser heat-sensitive recording materials having good sensitivity to laser light with a high light-to-heat conversion efficiency and, therefore, enabling high-speed recording for high-density, high-quality records. The polymethine compound of general formula (I) is quite highly soluble in various solvents used for making the light-to-heat conversion layer of original plates for direct printing plate making and has good compatibility with various binder resins and other components, facilitating preparation of coating compositions. It can thus form uniform light-to-heat conversion layers and is particularly suited for use in the manufacture of original plates for direct printing plate making.

What is claimed is:

1. A polymethine compound of the following general formula



wherein R₁ represents an alkoxy group which may be substituted; R₂ represents an alkyl group which may be substituted; R₃ and R₄ each represents a lower alkyl group

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or R₃ and R₄ may combinedly form a cyclic structure; X represents a hydrogen atom, a halogen atom or a substituted amino group; Y represents an alkoxy group which may be substituted or an alkyl group which may be substituted; Z represents a charge neutralizing ion.

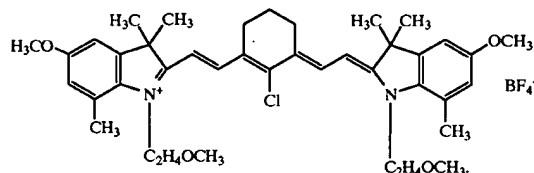
2. A polymethine compound as claimed in claim 1 wherein R₁ is an alkoxy group containing 1~4 carbon atoms, R₂ is an alkyl group containing 1~8 carbon atoms, an alkoxyalkyl group containing a total of 1~8 carbon atoms, a sulfoalkyl group containing 1~8 carbon atoms or a carboxyalkyl group containing a total of 2~9 carbon atoms, and Y is an alkoxy group containing 1~4 carbon atoms or an alkyl group containing 1~4 carbon atoms.

3. A polymethine compound as claimed in claim 1 wherein Z is Cl⁻, Br⁻, I⁻, ClO₄⁻, BF₄⁻, CF₃CO₂⁻, PF₆⁻, SbF₆⁻, CH₃SO₃⁻, p-toluenesulfonate, Na⁺, K⁺ or triethylammonium ion.

4. A polymethine compound as claimed in claim 1 wherein R₃ and R₄ each is methyl or R₃ and R₄ taken together is a cyclopentane ring or a cyclohexane ring.

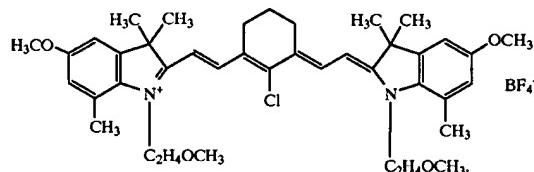
5. A polymethine compound as claimed in claim 1 wherein X is H, Cl, Br or diphenylamino.

6. A polymethine compound as claimed in claim 1 which is a low-melting crystal modification of 2-(2-{2-chloro-3-[{(1,3-dihydro-3,3,7-trimethyl-5-methoxy-1-methoxyethyl-2H-indol-2-ylidene)ethylidene]-1-cyclohexen-1-yl}ethenyl)-3,3,7-trimethyl-5-methoxy-1-methoxyethyl-indolum=tetrafluoroborate having the following formula and showing a powder X-ray diffraction pattern with characteristic peaks at the diffraction angles (20±0.2°) of 11.6°, 14.6°, 15.6°, 19.6° and 22.9° in Cu-Kα powder X-ray diffractometry



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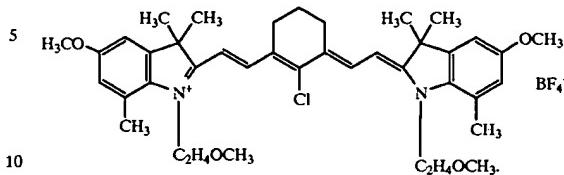
7. A polymethine compound as claimed in claim 1 which is a high-melting crystal modification of 2-(2-{2-chloro-3-[{(1,3-dihydro-3,3,7-trimethyl-5-methoxy-1-methoxyethyl-2H-indol-2-ylidene)ethylidene]-1-cyclohexen-1-yl}ethenyl)-3,3,7-trimethyl-5-methoxy-1-methoxyethyl-indolum=tetrafluoroborate having the following formula and showing a powder X-ray diffraction pattern with a characteristic high-intensity peak at the diffraction angle (20±0.2°) of 8.4° in Cu-Kα powder X-ray diffractometry



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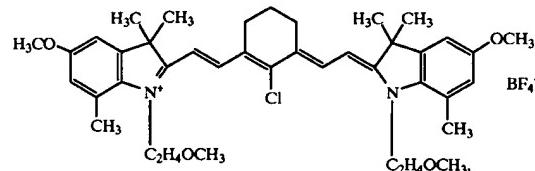
8. A polymethine compound as claimed in claim 1 which is a crystalline methanol adduct of 2-(2-{2-chloro-3-[{(1,3-dihydro-3,3,7-trimethyl-5-methoxy-1-methoxyethyl-2H-indol-2-ylidene)ethylidene]-1-cyclohexen-1-yl}ethenyl)-3,3,7-trimethyl-5-methoxy-1-methoxyethyl-indolum=tetrafluoroborate having the following formula and showing a powder X-ray diffraction pattern with characteristic peaks

at the diffraction angles (20±0.2°) of 13.3°, 17.4°, 19.8°, 21.8° and 26.9° in Cu-Kα powder X-ray diffractometry

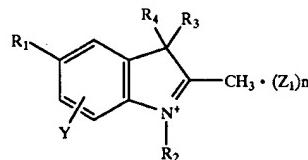


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9. A polymethine compound as claimed in claim 1 which is an amorphous form of 2-(2-{2-chloro-3-[{(1,3-dihydro-3,3,7-trimethyl-5-methoxy-1-methoxyethyl-2H-indol-2-ylidene)ethylidene]-1-cyclohexen-1-yl}ethenyl)-3,3,7-trimethyl-5-methoxy-1-methoxyethyl-indolum=tetrafluoroborate having the following formula and showing a powder X-ray diffraction pattern having no characteristic peak at the diffraction angle (20±0.2°) in Cu-Kα powder X-ray diffractometry

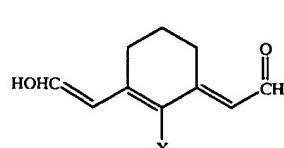


10. A process for producing the polymethine compound of claim 1 which comprises subjecting an indolenium compound of the following general formula (II) and either a diformyl compound of the following formula (III) or a dianil compound of the following formula (IV) to condensation reaction in a dehydrating organic acid in the presence of a fatty acid salt



(II)

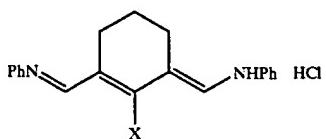
wherein R₁ represents an alkoxy group which may be substituted; R₂ represents an alkyl group which may be substituted; R₃ and R₄ each represents a lower alkyl group or R₃ and R₄ taken together represent a ring; Y represents an alkoxy group which may be substituted or an alkyl group which may be substituted; Z₁ represents a charge neutralizing ion; n represents a number of 0 or 1



(III)

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65 where X represents a hydrogen atom, a halogen atom or a substituted amino group

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wherein X represents a hydrogen atom, a halogen atom or a substituted amino group.

11. A process for producing low-melting crystals of the polymethine compound of claim 1 which comprises treating a crystalline solvent adduct or amorphous form of the polymethine compound of claim 1 with a solvent.

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- (iv) 12. A process for producing high-melting crystals of the polymethine compound of claim 1 which comprises recrystallizing the polymethine compound of claim 1 from a ketonic or alcoholic solvent.
- 5 13. A near infrared absorbing material comprising the polymethine compound claimed in claim 1.
- 10 14. An original plate for direct printing plate making which comprises the polymethine compound of claim 1 in a light-to-heat conversion layer constructed on a substrate.
- 15. A method of manufacturing a printing plate which comprises irradiating the original plate for direct printing plate making claimed in claim 14 with light using a semiconductor laser having a light emission band of 750 nm~900 nm as a light source.

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